



Control of White Blister Rust in broccoli and cauliflower

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Figure 1: Blisters on the underside of broccoli leaves.

White Blister Rust is a disease caused by the fungus *Albugo candida*. This fungus affects most plants of the brassica or crucifer family and the common strain of the fungus is widely distributed throughout Australia. A new strain of White Blister Rust, known as strain 9, has been recently identified on properties at Bindoon, Bullsbrook, Guilderton, Munster, Myalup and Wanneroo. This strain infects broccoli and cauliflower crops.

The fungus may have both local and systemic expression of symptoms. Early leaf symptoms of white 'blisters' can only be seen on the underside of leaves. As the symptoms progress, circular areas of leaf discoloration (light green to yellow) appear on the upper leaf surface, corresponding to white blisters on the underside of the leaves (Figure 1). Systemic infections can cause abnormal growth and distortion of affected plants (Figure 2). In seedlings, affected plants may look 'leggy' and taller compared to non-affected seedlings due to the abnormal growth of the affected seedlings.



Figure 2: Swelling of stem caused by White Blister Rust.

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Figure 3: White Blister Rust infection on broccoli head.

The fungus appears to infect areas of broccoli and cauliflower that contain chlorophyll (i.e. those parts of the plant that are green). In broccoli, the fungus can infect both leaves and heads (Figure 3), however it has only been seen on cauliflower leaves and not the white curd.

White Blister Rust needs optimum conditions for it to heavily infect brassicas. The spores of the fungus will germinate from 1 to 20°C however the optimum temperature for spore germination is from 10 to 14°C. Once infection has commenced, temperatures from 10 to 25°C suit the development of the disease. Leaves that remain wet (e.g. from dew, fog, rain or irrigation) for some time will also promote the development of White Blister Rust. A comparison with the common strain of the fungus indicates that it may be a problem on farms for only a short time of the year.

How does the fungus spread?

The fungus can be spread by many different methods including:

- infected produce (e.g. broccoli heads) and leaves;
- crop debris;
- rain or irrigation splash;
- wind and soil that contain the spores;
- infected seedlings;
- contaminated seed.

Volunteer broccoli and cauliflower crops as well as brassica weeds (e.g. wild radish and wild turnip) may also be hosts for the disease.

Managing the fungus

To restrict the movement of the fungus to production areas and farms where it has not presently been detected, good hygiene practices should be implemented by broccoli and cauliflower producers and seedling production nurseries. These hygiene practices (termed on-farm biosecurity) should also be used on farms where the fungus has been detected as it will assist in minimising the impact of the disease on broccoli and cauliflower. Good hygiene practices include:

Seedling production nurseries

- restrict access by visitors to seed and seedling areas;
- have a dedicated seedling pick up and return area that is separate from the seedling production area;
- ensure that nursery staff and visitors are aware of nursery hygiene practices;
- remove brassica weeds and volunteer seedlings from the nursery area;
- inspect seedlings regularly for symptoms of the disease.

Broccoli and cauliflower producers

- restrict access by visitors to paddock areas (using signs or have a designated meeting place for visitors);
- ensure farm staff and visitors are aware of the farm hygiene practices;
- regularly inspect broccoli and cauliflower crops for symptoms of the disease;
- inspect seedlings for symptoms of the disease upon their arrival at the farm or when collecting from the nursery;
- prevent the movement of soil and organic matter on to the farm by:
ensuring that all equipment (bins, crates etc.) and machinery entering the farm has been thoroughly cleaned prior to arriving at the farm, preferably with a high pressure washer;
ensuring that all staff and visitors entering the farm do not have soil and organic matter on their shoes and equipment;
- remove volunteer brassica plants and brassica weeds, particularly around crops and in non-host (i.e. non-brassica) crops;
- producers who grow their own seedlings should follow the information for seedling production nurseries and ensure that seedling production areas are not located close to growing crops.

Other practices beside on-farm biosecurity that can be used to manage White Blister Rust include:

- rotate brassica crops with non-host crops to reduce the risk of the infection spreading if it is detected;
- destroy brassica crops soon after harvest to break down the brassica host. Crop residue should be ploughed or disked into the ground;

- plan watering so the leaves of broccoli and cauliflower are not wet for long periods (i.e. long light applications of water will favour disease formation). Avoid watering in the evening and at night if possible;
- increase the ventilation between plants by aligning planting rows in the direction of the wind and / or increasing the space between plants and planting rows;
- an emergency use permit (permit number PER6742, valid from 26 June 2003 until 25 June 2004) has been issued for fungicides containing both of the active ingredients 640g/kg Mancozeb and 40g/kg Metalaxyl-M. The fungicide should be used as a protectant only and must not be applied as a post-infection curative spray as this will favour the development of fungicide resistance by the disease. The instructions and application rate listed on the permit and label must be followed;
- producers should control other fungi such as downy mildew in their broccoli and cauliflower crops using registered fungicides at the label rates as this may assist to reduce the susceptibility of the plant to White Blister Rust. Registered fungicides which can be used to control downy mildew include the active ingredients mancozeb, metiram and cupric (copper) hydroxide. Read the label before using these products.

Acknowledgments

Figure 1, 2 and 3 were kindly supplied by Dr Elizabeth Minchinton, at the Victorian Department of Primary Industries, Knoxfield, Victoria.

ALWAYS READ THE LABEL

Users of agricultural (or veterinary) chemical products *must always* read the label and any Permit before using the product, and strictly comply with the directions on the label and the conditions of any Permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this publication.

Parts of the chemical use pattern quoted in this publication are approved under Permit(s) issued by the Australian Pesticides and Veterinary Medicines Authority (APVMA) and in force at the time the publication was prepared. Persons wishing to use a chemical in the manner approved under Permit should obtain a copy of the relevant permit from the APVMA and *must* read all the details, conditions and limitations relevant to that Permit, and must comply with the details, conditions and limitations prior to use.

This material was prepared on 26 June 2003 and was provided in response to an emergency situation. The information it contains is based on current scientific knowledge on the particular subject at the time of preparation. It relates to the specific emergency situation only and should not be used for any other purpose.

